"Endemic Species from Ancient Strands and Recently Observed Modifications of Seed-plants on the Beaches of the Salton Sea," by Daniel T. MacDougal. (Read by title.)

"Divergent Characters of the Progeny Arising from Seed Maturing in Treated Ovaries of *Scrophularia occidentalis*," by Daniel T. MacDougal. (Read by title.)

"Association of Hereditary Factors in Parthenogenetic Lines of *Hydatina*," by A. Franklin Shull.

"An Inherited Variation in the Strength of Linkage," by A. H. Sturtevant (by invitation).

"Size Inheritance in *Drosophila*," by Edward N. Wentworth. (Read by title.)

"Studies on Inheritance in Orthoptera," by Robert K. Nabours (by invitation).

"Physiological Resistance to Drought in F_2 Segregates of Certain Maize Crosses," by Herbert P. Roberts. (Read by title.)

"Partially Sterile Crosses between Species of *Nicotiana*," by Edward M. East. (Read by title.)

"Reciprocal Crosses between *Œnothera biennis* and *Œnothera muricata*," by Bradley M. Davis. (Read by title.)

The session of the afternoon consisted of a symposium on the subject "The Scope of Biological Teaching in Relation to New Fields of Discovery," Papers were presented by Michael F. Guyer, University of Wisconsin—Zoology; Mintin A. Chrysler, University of Maine—Botany; Robert R. Bensley, University of Chicago—Anatomy and Medicine; George H. Parker, Harvard University—General Physiology.

In the discussion following the reading of the four principal papers, Drs. Goldfarb, Atkinson, Loeb, Clapp, McMurrich, Morgan, McClung, Lefevre, Reighard, Henderson and Knower participated.

The Naturalists' dinner was held on the evening of December 31, at the Hotel Walton, with one hundred and ten in attendance. The president's address by Professor Ross G. Harrison was entitled "Science and Practise."

The officers of the Society for 1914 are:

President—Samuel F. Clarke, Williams College.

Vice-president—Frank R. Lillie, University of Chicago.

Secretary—Bradley M. Davis, University of Pennsylvania.

Treasurer—J. Arthur Harris, Carnegie Station for Experimental Evolution.

Additional Members of the Executive Committee—Raymond Pearl, Maine Agricultural Experiment Station; Ross G. Harrison, Yale University, and Elias P. Lyon, University of Minnesota.

BRADLEY M. DAVIS,
Secretary

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION E—GEOLOGY AND GEOGRAPHY

THE sixty-fifth meeting of Section E, Geology and Geography, of the American Association for the Advancement of Science was held in the senate chamber of the state capitol, Atlanta, Ga., December 28, 1913, to January 1, 1914. Vice-president J. S. Diller presided. Professor U. S. Grant, Northwestern University, Evanston, Ill., was elected vice-president of the association and chairman of Section E for the next meeting to be held in Philadelphia. Dr. E. H. Sellards, state geologist of Florida, was elected a member of the council, Dr. David White, United States Geological Survey, a member of the sectional committee, and Dr. S. W. McCallie, state geologist of Georgia, a member of the general committee.

IN connection with the meeting the following resolutions were unanimously adopted:

WHEREAS, it is recognized that the American Association for the Advancement of Science is the great scientific organization of this country, and,

WHEREAS, it is hoped that this organization may continue to fulfil its great function as the representative of science in America,

Be it Resolved, that it is the sense of Section E, an important branch of the parent organization, that the strongest men interested in geology and geography should be urged to assist in every way possible in promoting the best interests of the general organization,

Furthermore, in the belief that these purposes can be most effectively accomplished by the cooperation of existing geological and geographical organizations, it is recommended that every effort be made to have the meetings of the Geological Society of America and the Association of American Geographers held, as frequently as possible, in connection with those of the American Association for the Advancement of Science,

It is Further Recommended, that the officers of Section E, with the approval of the council, be instructed to take such steps as are necessary to secure the desired results.

The address of the retiring Vice-president, Professor J. E. Todd, was given on the subject, "Pleistocene History of the Missouri River."

The program consisted of more than thirty papers, the majority of which dealt with the mineral resources of the southern states. It is hoped that all the papers on the mineral resources of the southern states may be published in one volume. As an aid to such publication the council voted the sum of $200.

The titles and abstracts of papers presented before Section E are given below:

Mineral Resources of the Southern States—Distribution and Production: J. S. DILLER. (Illustrated by map and collection of specimens.)

In opening the discussion of the mineral resources of the southern states, Mr. Diller called attention to a large wall map recently prepared by the United States Geological Survey to show the distribution of the most important mineral resources of the sixteen states included in the southern section.

Of the various mineral products found in the United States only two, borax and platinum, are not produced in the southern states but, on the other hand, some of the southern states are the largest or exclusive producers of nearly a dozen substances, among which phosphate rock, manganese, bauxite, sulphur, barite and fuller's earth occur.

There are 55 different mineral substances won from the earth in the southern states, and of these a collection consisting of more than a hundred specimens was exhibited at the meetings of Section E.

Coal is the resource of first importance. The value of coal alone produced in 1912 was more than 144 million dollars, with large reserves, as shown on the map, that will last for centuries.

The total production of mineral resources in 1912 was $401,399,483.

Nearly a score of other substances in addition to coal were produced in the same region to the value of more than a million dollars each, and while the distribution of the reserves of these resources was shown on the large map the value of the production of each during 1912 was shown on a chart.

It is expected that the map and chart will be published in connection with the volume of papers read before Section E on the mineral resources of the southern states.

The Coal Resources of the Southern States: L. C. GLENN.

This paper summarized our knowledge of the coal resources of the southern states, indicated the trend of present developments, and showed the importance of the rôle to be played by coal in the future industrial development of the south. It was illustrated by charts and diagrams.

The Petroleum Resources of the Southern States: D. W. OHERN.

The Marbles and Granites of the Southern States: S. W. MCCALLIE.

The geographical and geological distribution, history and extent of development, physical and chemical characteristics, and commercial uses of the marbles and granites of the southern states.

The Mines and Quarries of Georgia: S. W. MCCALLIE. (Illustrated with lantern slides.)

The Piedmont Limestones of the Southeast Atlantic States: THOMAS L. WATSON AND J. S. GRASTY.

This paper discusses the occurrence and distribution, structural and age relations, composition and uses of the Piedmont limestones of the southern Atlantic states, including Maryland to Alabama. It points out their much wider distribution than has been formerly supposed and suggests their Lower Cambrian (Loudoun) age. Besides being of economic importance in many of their occurrences, these limestones form extremely important and valuable guide members in the structural work necessary to determine the stratigraphic and age relations of the associated rocks.

The Limestones of Maryland, East of the Blue Ridge: J. S. GRASTY.

This paper is devoted to the various occurrences of limestone in the Piedmont section of Maryland, and embraces a discussion of their age, stratigraphy, structure and economic importance. With the exception of the occurrences in the Frederick Valley, and in the vicinity of Baltimore, practically no attempt, based on systematic study, has been made heretofore at a correct correlation. It is believed that it can be shown definitely and satisfactorily that the limestones in the middle part of this physiographic division (Piedmont) of Maryland should be assigned to the Potsdam group of the Cambrian, though-be-it this is at variance with the general geological impression, which is that they are older, a view entertained, perhaps, because of their association in areal occurrence with other rocks definitely known to be pre-Cambrian.

The Slate Deposits of the Southern States: J. S. GRASTY AND J. H. CLINE.

This paper is devoted to a discussion of the more important slate deposits of the southern states, including their location, structural and age relations, quality, etc., particular attention being given to those areas occupied by active operations. This accounts, therefore, for the prominent position and greater space being given in this discussion to the occurrences in Virginia and Maryland. Slates occur also in Georgia, notably the green slate found to the north of Cartersville, and in Arkansas, Tennessee, West Virginia and elsewhere in the south.

The Cement Materials and Industry of the Southern States: Thomas L. Watson and J. S. Grasty.

The Portland cement industry in the southern states is an important and growing one. Calcareous (limestones or marls or both) and argillaceous (clays, shales and slates) materials are found in each of the southern states, being particularly well developed in those states traversed by Ordovician, Silurian and Devonian rocks. The present paper discusses the occurrence and distribution of these materials, including composition, and explains how their adaptability for use in the manufacture of Portland cement may be determined.

The Gypsum Resources of the Southern States: Frank A. Wilder.

Gypsum in quantities sufficient to be of commercial importance occurs in Oklahoma, Texas and Virginia. In Arkansas large deposits are said to exist in Pike county but their fitness for plaster can not be positively stated. A small body of gypsum is reported from Bear Island near the postoffice of Panassoffke, Fla., but this deposit is of doubtful commercial importance.

The deposits in Oklahoma and Texas are inexhaustible and consist of both rock gypsum and gypsum earths known as gypsite.

The Virginia deposit is much more limited in area and in tons available, but can probably maintain an annual output of 200,000 tons for fifty years or more.

The Virginia gypsum deposit is peculiar on account of the rather unusual relationships between the gypsum and a pronounced fault which has thrust Cambrian dolomite over the gypsum-bearing formations which we regard as of Mississippian age.

On account of the rapid increase in the use of gypsum plasters, gypsum tile for fireproofing, and in portland cement, of which gypsum is a minor but very essential ingredient, these gypsum deposits are important factors in the development of the south.

In connection with agriculture ground gypsum is regarded as essential in the raising of peanuts and is useful in the cultivation of all legumes. It doubtless is the cheapest way to restore sulphur to the soil where this element has been exhausted, and reacts on insoluble potash compounds, rendering them more soluble.

The Gypsum Resources of Texas and Oklahoma: E. T. Dumble.

The location and character of the gypsum deposits of Texas and Oklahoma now being exploited commercially. Present development of the industry, and possibilities of this area. Description of other areas in Texas susceptible of similar development.

The Bauxite Industry in the Southern States: W. C. Phalen.

The production of bauxite in the United States in 1912 was, in round numbers, 160,000 long tons, valued at approximately $775,000. In other words, this means the production of bauxite in the southern states, for the mining of this mineral is strictly a southern industry, and such it has been since its inception in the United States.

The states which produced bauxite in 1912 are as follows: Alabama, Arkansas, Georgia and Tennessee. A deposit of the mineral is known also in Botetourt county, Virginia, but it has never been exploited. Arkansas led in the production, as it has for many years, followed distantly by Georgia, Alabama and Tennessee, named in the order of their production and the value of same.

Bauxite has a variety of uses, which are as follows: (1) As raw material in the production of metallic aluminum, (2) in the manufacture of aluminum salts, (3) in the manufacture of bauxite brick, (4) in the manufacture of alundum (fused alumina) for use as an abrasive, and (5) in the manufacture of calcium aluminate.

The use of bauxite in the manufacture of metallic aluminum is by far the most important of those enumerated above. A large part of the entire output of Arkansas is used in the aluminum industry, and the production from this state has shown phenomenal growth during recent years. When it is considered that more than 65,000,000 pounds of the metal were consumed in the United States during the past calendar year, and that this aluminum in the form of No. 1 ingots, whole-

sale lots in New York City varied in price per pound from 18½ to 27 cents, the importance of the relation of bauxite production to what promises to be one of our most important future metallic industries becomes apparent, as does also the importance of a careful search for future supplies of the mineral.

The Outlook for the Aluminum Industry in the South:

Two water-power installations of great magnitude, for the manufacture of metallic aluminum, are now in process of construction in the southern states. One of these is by the Southern Aluminum Company and the other by the Aluminum Company of America. The former, with a capital of several million dollars, has been organized by an amalgamation of foreign aluminum interests, chiefly French, together with certain metal interests in the United States, and has acquired a water-power site on the Yadkin River, near Whitney, North Carolina. The company is now engaged in the development of the property, and has plans to erect, eventually, a complete plant with large capacity for the manufacture of the metal.

In addition, the Aluminum Company of America has acquired certain riparian rights in North Carolina and Tennessee, and has undertaken preliminary developments on the Little Tennessee River near the Tennessee-North Carolina boundary. The plans contemplate a water-power development of great magnitude, together with a reduction works at Maryville, 16 miles south of Knoxville.

The consummation of two such projects as those mentioned should prove a tremendous stimulus to the search for new deposits of bauxite in the south.

The Phosphate Deposits of the Southern States: E. H. SELLARDS.

The southern states at the present time are preeminently the source of phosphate rock in the United States, the total rock mined elsewhere in America being not more than 10,000 or 11,000 tons per annum. In fact this section contributes fully one half of the phosphate of the world. The statistics for 1910, the latest date at which approximately complete returns are available show the world's production of phosphate to be 5,156,671 metric tons, of which the United States produced 2,697,468 metric tons, or slightly more than one half, all of which with the exception of 11,612 tons was from the southern states. The production in the southern territory during 1911 was 3,420,774 long tons, while Florida alone in 1912 produced 2,579,865 long tons.

The phosphate deposits in the southern states are widely distributed and are diverse in their origin and manner of occurrence. Those states that are actively producing rock are: Arkansas, Tennessee, South Carolina and Florida. At least five other states, namely, Kentucky, Virginia, North Carolina, Georgia and Alabama are known to have phosphate, or phosphatic marls of agricultural value. The phosphate deposits of North Carolina and Kentucky have been mined to a limited extent. Those of Georgia and Alabama have been partially prospected, while the Virginia phosphates have been but recently discovered.

The methods used in mining the phosphate rock are, as a rule, neither complicated nor expensive. The open pit method is used for those deposits that have a removable overburden, while underground mining is resorted to only for those bedded deposits that are interstratified with other formations so that the overburden can not be removed. The chief production at the present time is from the open pit mines. After being taken from the mine the rock is washed and dried for shipment, almost one half being exported.

The Tennessee Phosphates: T. POOLE MAYNARD.

The phosphate deposits of Tennessee rank next in importance to those of Florida.

These deposits are found in what is known as the Central Basin of Tennessee, and in the valleys of the western part of the Highland rim surrounding this basin. Nodular deposits of black phosphate are found to the northeast of the Highland Rim in Putnam county.

All of the phosphates are found associated with rocks of sedimentary origin and occur in rocks of Ordovician and Devonian age.

There are three important classes of phosphate rock, while there are many characteristic differences among these classes. The brown, the blue and the white phosphate represent the three important classes. While the black rock phosphates of Putnam county are not economically important they form a fourth class.

The Salt Industry of the Southern States: W. C. PHALEN.

The five southern states which produce salt on a commercial scale, named in the order of their importance, are Louisiana, Virginia, Texas, West Virginia and Oklahoma. In the year 1912, the latest for which statistics are available, the output of salt in the states mentioned amounted to

nearly 350,000 short tons, or nearly 2,500,000 barrels, of 280 pounds each, valued in round numbers at $725,000.

In Louisiana salt occurs in two districts, (1) in the north-central and northern part of the state in the valleys of the Red and Sabine rivers, and (2) in the southern part; the most important known deposits, and those worked at present, occurring in close proximity to the gulf coast. Rock salt is the product, mined at Weeks and Avery's islands, so-called, located in Iberia parish, very close to the Gulf of Mexico.

The only economically important deposits of salt found in Virginia occur in the southwest part of the state. These, with the gypsum deposits, extend for twenty miles along the valley of the north fork of the Holston River, and have been developed quite extensively in Smyth and Washington counties. Two gypsum plants and one alkali works, which utilizes the brines, are in operation in this area. Saltville, Smyth county, is the center of the alkali industry.

The important salt industries of Texas are located at Palestine, Anderson county, Grand Saline, Van Zandt county, in the eastern part of the state, and at Colorado, Mitchell county, in the western part. The bulk of the salt marketed in Texas is the evaporated article produced by the grainer process, but considerable also comes from the inland salt lakes in the western part of the state and from the lagoons along the southwestern coast.

In West Virginia the industry is confined to the Ohio River Valley and to the valley of the Kanawha River, a few miles above Charleston, the state capital. The product is evaporated salt produced by the grainer process. Bromine and calcium chloride are also produced on a considerable scale, in connection with the manufacture of salt.

In Oklahoma the salt industry is small, and is confined to the salt plains in the southwestern part of the state.

The Asbestos Deposits of Georgia: OLIVER P. HOPKINS.

Asbestos representing three modes of occurrence is found in Georgia. Chrysotile, occurring in serpentine derived from peridotite, is present in insignificant quantities in a few localities where it gives no promise of commercial importance. Asbestos of the amphibole variety in slip-fiber veins occurs at widely distributed points over the Piedmont area of the state; while mass-fiber asbestos, which represents the important deposits from a commercial point of view, is restricted, in general, to the belt of peridotites and pyroxenites which cross the state in a southwest direction from Rabun county to Harris county, but is relatively most important in Rabun, White and Habersham counties than any others. Judging from the field relations and the microscopic study, it has been concluded that the mass-fiber anthophyllite has been derived from enstatite-olivine rocks.

Mass-fiber asbestos, owing to the nature of its occurrence, is capable of being mined very economically, but owing to the slight demand for the material little is being put on the market at the present time. With a good demand for the material at from $10 to $12 per ton a number of deposits in this state could be worked at a profit and a large amount of asbestos could be put on the market.

The Production of Fuller's Earth in the Southern States: E. H. SELLARDS.

Fuller's earth is a clay which has the property of absorbing basic colors and removing these from solution in animal, vegetable and mineral oils, as well as from water and certain other liquids. In commerce the earth finds its chief use in clarifying oils, although it has in addition a number of minor uses.

Fuller's earth, like other clays, is complex and consists not of a single mineral, but of a variety of minerals, the mineral particles being mixed in different earths in widely different proportions, resulting in a varying chemical and mineralogical composition. The ultimate analysis does not differ materially from that of other clays. The properties of the earth arise apparently from the physical condition of the clay and can be detected only by a filtering test by which its practical utility in clarifying oils is determined. Various other properties are assigned to fuller's earth but all, aside from actual bleaching tests, are so variable or are common to such a variety of clays as to be of only secondary value in identifying fuller's earth.

Fuller's earth is mined chiefly by the open pit method, the overburden being removed and the earth dug by pick and shovel. It is then crushed, dried, ground, bolted and sacked for shipment. That intended for clarifying mineral oils is ground to pass 30–60 or a 60–80 mesh sieve while that intended for clarifying edible oils is usually ground to 100 mesh. The action of fuller's earth in clarifying oils is believed to be due chiefly to colloidal silica present in the clay. It is a notable fact that clays suitable for clarifying mineral oils

are in some cases at least unsuited for use on edible oils and the converse is also true. Most fuller's earth gives a taste and odor to edible oils, but it is now known that this can be removed by blowing dry steam through the refined oil heated above the boiling point of water. Some fuller's earths have so rapid an oxidizing effect on edible oils that the mass takes fire when air is blown through to force out the oil remaining in the earth after treatment. This defect in the earth can not at present be remedied.

In the United States fuller's earth was produced during 1912 by seven states. Of these one, Massachusetts, is an eastern state; two, California and Colorado, are western states; and four, Arkansas, Florida, Georgia and Texas, are southern states. The total output of fuller's earth in the United States during 1912 according to the United States Geological Survey was 32,715 tons, all of which with the exception of one or two thousand tons is from the four southern states named, by far the largest part, probably as much as 25,000 tons, being produced in Florida.

The Clay, Brick, Pottery and Bauxite in Tennessee: WILBUR A. NELSON.

A general account of the clay resources of Tennessee, giving the location of ball-clay deposits in west Tennessee, and some recent tests made by the Tennessee Geological Survey. Also a general account of the brick and pottery industry, and a brief description of the bauxite deposits of east Tennessee.

The Tripoli Deposits of Tennessee: L. G. GLENN.

Extensive deposits of tripoli are found in the Watanga shales of the Cambrian. They are the result of the leaching under surface influences of siliceous-argillaceous limestone beds, one of which is some forty feet thick and of very considerable length. The beds, of which six are known, dip at high angles. The depth to which they have weathered is not determined but is known to exceed fifty feet. The material is very similar to the tripoli now marketed for general scouring and polishing purposes.

The Occurrence, Conservation and Utilization of Certain Non-metallic Minerals of the Southern States: JOSEPH HYDE PRATT.

The Iron Ores of the Southern States: WILLIAM B. PHILLIPS.

The Zinc Deposits of Tennessee: A. H. PURDUE.

This paper gives the location of the zinc ores, extent of their area, occurrence and instructions as to prospecting; gives a brief history of zinc mining in Tennessee, with prominent mention of the old Embreeville mine, and also describes the present mining conditions and output.

The Copper Resources of the Southern States: C. H. GORDON.

This paper is an attempt to present briefly the present condition of our knowledge of the copper resources of the southern states.

Copper minerals are of widespread and general occurrence both in geographic position and in geologic age but the deposits of known age that have made important contributions to the country's output can be referred to four periods which in general correspond to periods of igneous activity, viz., the Precambrian periods, the Paleozoic era, the Mesozoic era and the Tertiary period. The chief Appalachian deposits belong to the Paleozoic era and constitute practically all the known deposits referable to this era.

As to their geologic relations the deposits of the southern states may be classed under four groups as follows: (1) Lenticular deposits in schistose rocks. These include mainly deposits of the sulphides of iron, copper and zinc in lenticular bodies in schistose rocks comprising in part altered sedimentary rocks and in part altered igneous masses of basic and acid types. (2) Deposits in fractured and brecciated zones. These include deposits in fissure veins and deposits formed in brecciated zones. (3) Deposits of native copper and cuprite disseminated in igneous rocks. Under this head are grouped deposits in which the copper occurs chiefly in the form of cuprite and native copper distributed along joint planes and crevices, and as disseminated grains in igneous rocks of basaltic type. (4) Disseminated deposits in the Red Beds of the Triassic area. These consist for the most part of films and thin coatings of malachite on joint faces and grains of sulphide and phosphate disseminated through the rock.

The chief deposits of the southern states belong to the first and second classes. Ninety-five and one half per cent. of the production of these states comes from the district of Ducktown in Tennessee. Of the remainder over two thirds is recovered as a by-product in the dressing of the lead ores of Missouri.

Physiographic Conditions that have Contributed to the Making of Atlanta: COLLIER COBB.

A Biological and Physiographic Reconnaissance of the Okefenoke Swamp: J. CHESTER BRADLEY. (Illustrated with colored slides.)

The Development of Some Lake Beds in Florida: E. H. SELLARDS.

This paper relates to the origin of the basins of the large flat-bottomed lakes found throughout certain parts of interior Florida. These lakes are often of considerable size, although relatively shallow as compared to their areal extent. Moreover they are variable in character. Under normal conditions they are clear water lakes abounding in fish and the favorite haunt of the wild duck. They have, as a rule, no surface outlet, yet from many of them the water has at times disappeared in a manner seemingly inexplicable. Among the largest and best known examples are: Lakes Lamonia, Jackson and Lafayette in Leon county; Miccosukie in Jefferson county; Alligator in Columbia county and Alachua in Alachua county.

These lakes occupy basins which have worked their way down through the surface sands and clays probably of the Alum Bluff formation to or nearly to the underlying limestones which are of either the Chattahoochee or the Vicksburg formations. The beginning of each basin dates from the formation of a sink making an opening through to the underlying limestone, thus diverting the surface drainage to a subterranean course. The small basin resulting from a single sink is enlarged by the formation of additional sinks, this process being promoted by the considerable amount of the surface water that is admitted into the underlying limestone, particularly when the sink has formed in the valley of an existing stream. The depth of the basin is limited by the underground water level since the streams can not well carry away the residual material below this level. As a matter of fact the basins approach but do not quite reach the underground water level.

The ground water level is not stationary but is subject to seasonal and periodic variations, as well as to variation in geologic time. The seasonal fluctuation is due to the variation in rainfall during the wet and dry seasons. The periodic variation is due to the more or less regular periods, often of some years duration, of deficient or of excessive rainfall. The gradual lowering of the underground water level during geologic time, which is due to the downward cutting of stream channels which serve as an outlet, affects the life history although not the observed behavior of the lakes. The seemingly sudden emptying of the lakes is in most cases due actually to the water having gradually run out into the underlying limestone because of the ground water level having been lowered by prolonged drought. New sinks are likely also to form at this time since the lowering of the underground water withdraws the support from the surface materials which are then no longer able to support their own weight and hence break through to cavities in the underlying limestone. These new sinks when formed facilitate the emptying of the lakes.

A New Gypsum Deposit in Iowa: GEORGE F. KAY.

In this paper some interesting facts are presented with reference to a gypsum deposit recently discovered at Centerville in southern Iowa. The gypsum is of Mississippian age and is associated with anhydrite. Whether or not the gypsum will prove to be of economic importance has yet to be determined. The evidence indicates that the deposit may be extensive and the gypsum is of good quality. The relation of the anhydrite to the gypsum and the relative amounts of the two minerals will have an important bearing upon the value of the deposit for commercial purposes. The fact that the deposit is more than 500 feet below the surface and the presence of large amounts of artesian waters are factors unfavorable to the mining of the gypsum. On the other hand, the deposit is well located with regard to fuel and transportation, and it is fair to assume that if gypsum products were made in this part of the state a good market for such products could soon be developed.

The Development of Some Underground Streams: EDGAR H. WEBSTER.

A Comparison of the Ordovician Section of Southwest Virginia, with that of New York: S. L. POWELL.

In view of statements not infrequently made to the effect that the Ordovician of Virginia and the South in general can not be correlated with the New York section, and in view of the fact that in southwest Virginia, in the vicinity of Salem, there occurs a continuous, unbroken section of Ordovician strata about four thousand feet in vertical thickness, very favorably disposed for observation, and as the locality is intermediate between the extremes heretofore most carefully studied, detailed work was undertaken for purposes of comparison with the standard sections north.

The results show that the correlation can be made, and that in almost every detail, including the divisions of the Beekmantown (Calciferous) established by Brainerd and Seely of Vermont. Without going into detail here, the main difference

in the Ordovician is at the top and near the bottom of the section. The alternating red and greenish yellow shales and sandstones (Bays) just beneath the Medina sandstone, occupying the position of the Juniata in the north, are here very fossiliferous, whereas in Pennsylvania and New York they are practically barren of life forms. Here it carries Orthoceratites, Gasteropods, Brachiopods, etc., in great abundance. The stratum here measures about eighty feet whereas in the north it is several hundred feet thick. The Hudson River is virtually the same as north. Just above the Trenton, however, occurs a heavy stratum of alternating sandstone and shale, Tellico of the south. The upper Trenton is massive rather impure light blue limestone, passing into thin bedded dark to black limestone with some shales intervening. The middle Trenton is characterized by a development of several hundred feet of black shale (Athens Shale) carrying Trilobites and many forms of Graptolites, among which are the whorled type described by Ruedemann from northeastern New York. This is followed by the Black River limestone, identical in almost every respect, lithologically as well as in fossil content, with that of New York. The same is true for the Birdseye beneath. The Birdseye terminates in a six-foot stratum of brecciated conglomerate, with fragments of limestone and chert ranging in size from one half inch to fifteen inches in diameter. The Chazy, which follows, agrees in its lithology and fossil content with that of Vermont, terminating in a ferruginous sandstone, which corresponds in position and character with the Isle La Motte sandstone.

Detailed work in the Beekmantown below has not as yet been completed, but thus far the divisions established by Brainerd and Seely of Vermont with their characteristic boundaries and fossils are believed to have been identified.

The "Undagraph," Its Use for the Study of Microseisms: OTTO KLOTZ. (Illustrated.)

Recent Backward Extension of the Life Record in Geologic Time: CHARLES KEYES.

The differentiation of life on our globe prior to the stage represented by the *Olenellus*, or Early Cambrian, zone, the oldest phase with which we have been acquainted, has lately passed from the realm of pure speculation to that of direct observation. The wide interest aroused by these recent discoveries of abundant well-preserved organic remains in rocks of undoubted pre-Cambrian, and hence pre-Paleozoic, age is secondary only to the enthusiasm produced a few months ago by the actual location of the fossiliferous horizons in the general geological column. As definitely determined these oldest fossil-bearing levels are stratigraphically more than two miles beneath all other known horizons yielding traces of life. The revelations, of course, materially modify all our previous notions on the subject. They open up a more inviting field of investigation than awaited paleontologists when the Paleozoics first revealed their secrets. Between the bottom of the Paleozoics and the old Azoic gneisses, as usually represented in the text-books of the science, we may now insert the complete schemes of two great fossiliferous successions each of greater stratigraphic and taxonomic importance than that of the entire Paleozoic sequence as now known.

Fauna of the Pleistocene Asphalt Beds at Rancho La Brea, California: J. C. MERRIAM. (Illustrated.)

Tertiary of the Great Basin Region: J. C. MERRIAM.

The Clinton-Niagara Sand Reefs, Dune Ridges and Lagoons—Bordering the Paleozoic Sea: COLLIER COBB.

GEORGE F. KAY,
Secretary

ATLANTA MEETING OF SECTION G

AT 2 P.M., Tuesday, December 30, the meeting of Section G was called to order by the chairman, Professor H. C. Cowles. In the absence of the secretary, Professor W. J. G. Land was made secretary *pro tem.* The following officers were elected. For member of the sectional committee for five years, Dr. D. T. MacDougal; for member of the council, Dr. C. Stuart Gager; for member of the general committee, Professor D. M. Mottier.

The Sectional Committee recommended and the association elected Professor G. P. Clinton, of New Haven, as vice-president and chairman for the Philadelphia meeting.

The following papers were read:

"The Evolution of a Botanical Problem: The Discovery of Sexuality in Plants," address of the retiring Vice-president, Duncan S. Johnson.

"The Water Requirements of Plants," by Lyman J. Briggs and H. L. Shantz.

"Samoan Vegetation," by W. J. G. Land.

W. J. V. OSTERHOUT,
Secretary